CLAIMS

I claim:

1. An arrayed waveguide grating comprising:

at least a first waveguide having a first width and a first length; and

a second waveguide having a second width different from the first width and a second length different from the first length.

2. The arrayed waveguide grating of claim 1, further comprising:

at least one input waveguide;

an input slab waveguide optically coupled to the input waveguide;

the arrayed waveguide grating optically coupled to the input slab waveguide;

an output slab waveguide optically coupled to the input slab waveguide via the arrayed waveguide grating; and

at least one output waveguide optically coupled to the output slab waveguide;

3. The arrayed waveguide grating of claim 1 wherein the first waveguide comprises an average width which is different from an average width of the second waveguide.

4. The arrayed waveguide grating of claim 1 wherein the first width is constant along a length of the first waveguide, and the second width is constant along a length of the second waveguide.

5. The arrayed waveguide grating of claim 1 wherein the first waveguide and the second waveguide each comprise a tapered first end and a tapered second end and an intermediate segment therebetween, wherein the intermediate segment of the first waveguide comprises a width which is constant along a length of the first waveguide and which is different from an average width of the intermediate segment of the second waveguide.

6. The arrayed waveguide grating of claim 1 wherein the first waveguide comprises an average width which is different from an average width of the second waveguide such that a standard deviation of a width along a length of the first waveguide divided by the average width of the first waveguide is less than about 0.1, and a standard deviation of a width along a length of the second waveguide divided by the average width of the second waveguide is less than about 0.1.

7. The arrayed waveguide grating of claim 1 wherein the first waveguide and the second waveguide each comprise a tapered first end and a tapered second end and an intermediate segment therebetween, wherein an average width of the intermediate segment of the first waveguide is different from an average width of the intermediate segment of the second waveguide,

such that a standard deviation of a width along a length of the intermediate segment of the first waveguide divided by the average width of the first waveguide is less than about 0.1, and a standard deviation of a width along a length of the intermediate segment of the second waveguide divided by the average width of the second waveguide is less than about 0.1.

8. The arrayed waveguide grating of claim 1 wherein each of the waveguides in the arrayed waveguide grating comprise buried channel waveguides.

9. The arrayed waveguide grating of claim 1 wherein each of the waveguides in the arrayed waveguide grating comprise silica.

10. The arrayed waveguide grating of claim 8 wherein the buried channel waveguides comprise silica.

11. The arrayed waveguide grating of any of claims 1-10 wherein each of the widths of the waveguides in the arrayed waveguide grating is configured to provide a predetermined polarization dependent wavelength.

12. The arrayed waveguide grating of any of claims 1-10 wherein the waveguides in the arrayed waveguide grating are configured according to Eq. 11a.

13. The arrayed waveguide grating of claim 12 wherein $\Phi_i=0$ in Eq. 11a.

14. The arrayed waveguide grating of claim 12 wherein a variation of average birefringence is caused by a variation in an average width of the waveguides in the arrayed waveguide grating.

15. The arrayed waveguide grating of claim 13 wherein a variation of average birefringence is caused by a variation in an average width of the waveguides in the arrayed waveguide grating.

16. The arrayed waveguide grating of any of claims 1-10 wherein the waveguides in the arrayed waveguide grating are configured according to Eq. 11a and Eq. 11b.

17. The arrayed waveguide grating of claim 16 wherein $\Phi_i=0$ in Eq. 11a.

18. The arrayed waveguide grating of claim 16 wherein $\Psi_i = m\lambda_0$.

19. The arrayed waveguide grating of claim 17 wherein $\Psi_i = m\lambda_0$.

20. The arrayed waveguide grating of any of claims 1-10 wherein the waveguides in the arrayed waveguide grating are configured according to Eqs. 15.

21. The arrayed waveguide grating of any of claims 1-10 wherein the waveguides in the arrayed waveguide grating are configured according to Eqs. 16.

22. The arrayed waveguide grating of any of claims 1-10 wherein the waveguides in the arrayed waveguide grating are configured according to Eqs. 17.

23. The arrayed waveguide grating of any of claims 1-10 wherein the waveguides in the arrayed waveguide grating are configured according to Eqs. 18.

24. The arrayed waveguide grating of any of claims 1-10 wherein the waveguides in the arrayed waveguide grating are configured according to Eq. 19.

25. The arrayed waveguide grating of any of claims 1-10 wherein the waveguides in the arrayed waveguide grating are configured according to Eq. 24a and Eq. 24b.

26. The arrayed waveguide grating of claim 12 wherein a variable L_i in Eq. 11a comprises non-tapered segments.

27. The arrayed waveguide grating of claims 5 or 7 wherein the first tapered end and the second tapered end comprises a length less than about 1 mm.

28. The arrayed waveguide grating of any of claims 1-10 wherein a value of $|w_N - w_1|$ is between about 0.5 μm and about 5 μm.

29. The arrayed waveguide grating of claim 28 wherein the value of $|w_N - w_1|$ is between about 1 μm and about 3 μm.

30. The arrayed waveguide grating of any of claims 2-7 wherein the waveguides in the arrayed waveguide grating comprise buried channel waveguides.

31. The arrayed waveguide grating of any of claims 2-7 wherein the waveguides in the arrayed waveguide grating comprise silica.

32. The arrayed waveguide grating of claim 30 wherein the buried channel waveguides comprise silica.

33. A method of providing a predetermined polarization dependent wavelength in an optical device comprising:

transmitting light into a first waveguide having a first width and a length;

transmitting the light into at least a second waveguide having a second narrower width and a longer length.

34. The method of claim 33 further comprising transmitting the light into a plurality of additional waveguides, wherein each of the additional subsequent waveguides has an increasing length and a corresponding decreasing width.

35. The method of claim 33 wherein the light is transmitted into the first and the second waveguides simultaneously.

36. The method of claim 33 wherein the light is transmitted into the first waveguide before the second waveguide.

37. The method of claim 33 wherein the light is transmitted into the second waveguide before the first waveguide.